Measles in Hawaii – One Outbreak, Multiple Learning Opportunities

Melissa Viray, MD
Deputy State Epidemiologist
Hawaii Department of Health
July 31, 2014

Setting the Stage

- Report received at the Hawaii Department of Health (HDOH) from an infectious disease pediatrician
  - Hospitalized child with fever, rash, and high suspicion for measles
  - Unvaccinated, recently visited the Philippines
  - Ill during the flight(s) back to Hawaii
  - Visited multiple outpatient offices and emergency rooms while ill
  - Has not been on isolation precautions

Measles (Rubeola): The Basics (I)

- Febrile rash illness
  - High fevers (>103 F), malaise, anorexia
  - '3 Cs': conjunctivitis, coryza, cough
  - Morbilliform rash develops after fever

First image courtesy of Immunization Action Coalition: http://www.vaccineinformation.org/measles/photos.asp.
Second image courtesy of CDC: http://www.cdc.gov/measles/about/photos.html. Accessed July 9 and 24, 2014

Measles (Rubeola): The Basics (II)

- Incubation period 7–21 days
- Koplik spots: pathognomonic but not always present
- Illness duration typically 7–10 days

Image courtesy of CDC: http://www.cdc.gov/measles/about/photos.html. Accessed July 9, 2014

Measles: The Basics (III)

- Complications can be severe
  - Post-infection immune suppression -> pneumonia and/or inner ear infections
  - Encephalitis (0.1% of reported cases, up to 15% mortality)
  - Subacute sclerosing panencephalitis (SSPE)
  - Death (0.2–0.3% of reported cases)
- Complications more likely in patients < 5 years and > 20 years

Measles Transmission

- Highly contagious
  - Spread through droplets (air, surfaces)
  - Can be present in the air, on surfaces for 2 hours
  - 90% secondary infection rate in susceptible individuals
  - Contagious 4 days before through 4 days after rash onset
- URGENT reportable condition in Hawaii

Prevention of Measles (I)

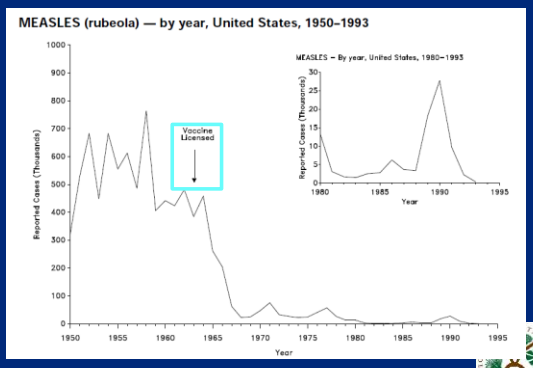
- Vaccine preventable disease
  - Human-only disease – theoretically eradicable
  - Live vaccine (MMR) highly effective
    - 96% (range 84-100%) immune after first dose
    - 98-100% will be immune after a second dose
  - Advisory Committee on Immunization Practices (ACIP): routine vaccination for all children and non-immune adults

Prevention of Measles (II)

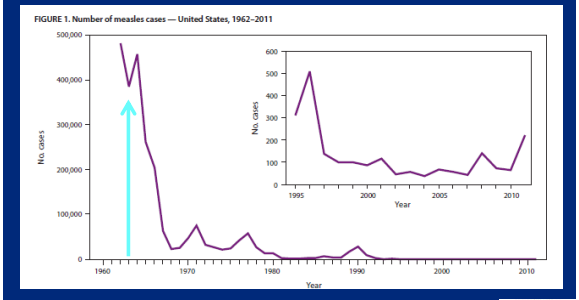
- Post-exposure prophylaxis (PEP)
  - Short window of opportunity
  - May not be as effective as routine vaccination
  - MMR vaccination within 3 days
  - Immunoglobulin in those who cannot be vaccinated within 6 days of exposure

Measles Epidemiology

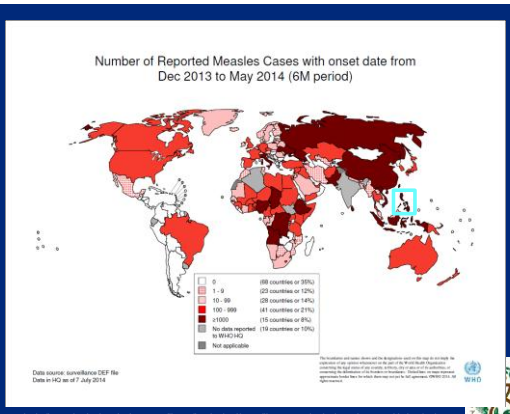
- Marked decrease in incidence in United States after vaccine introduction (1963)
  - Previously, estimated 3–4 million infections a year
  - Average 549,000 cases reported annually
- Eliminated in the United States in 2000
- Still prevalent in developing nations



CDC. *Morbidity and Mortality Weekly Report (MMWR)* (1994);42(53):1–73



CDC. *Morbidity and Mortality Weekly Report (MMWR)* (2013);62(RR04):1–34

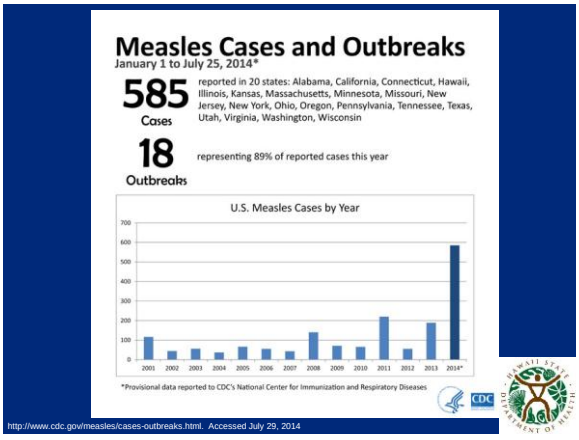


http://www.who.int/immunization/monitoring_surveillance/burden/vpd/surveillance_type/active/measles_monthlydata/en/
Accessed July 29, 2014

Measles in the Developed World

- Recent resurgence in developed countries
  - Importation from endemic countries
  - Introduction into susceptible communities
  - 2011: Western Europe – France, Spain, Italy
  - 2014: US – California, Ohio, New York City

CDC. *MMWR* (2013);62(02):27–31
CDC. *MMWR* (2014);63(22):496–499



http://www.cdc.gov/measles/cases-outbreaks.html. Accessed July 29, 2014

Back to Our Scenario

- Child confirmed with measles (IgM in serum)
- Need for urgent public health response
  - Identify all possible contacts
    - Planes, household, daycare/school, outpatient offices, emergency rooms, inpatient care
    - High risk of secondary cases if non-immune
  - Identify immune status of all exposed
    - Post-exposure prophylaxis possible *if given early*
    - Follow non-immune contacts for 21 days
  - Each secondary case requires similar contact follow up

Infection Control Implications (I)

- Healthcare a prime area for spread
  - Healthcare workers (HCW) with greater opportunity for exposure
  - Relatively close quarters
  - Aerosol-producing procedures
  - Shared healthcare staff, rooms
- Primary site of transmission in past outbreaks

Infection Control Implications (II)

- Risk for transmission to ill, immunocompromised individuals -> some cannot be vaccinated
- Considerable cost and disruption in containing outbreak after the fact
  - In particular if no documentation on staff immunity available
  - Time
  - Furloughs
  - Post-exposure prophylaxis

Blocking Transmission of Disease in Healthcare

- Imperative to prevent transmission where possible
  - Maintenance of an immune workforce
  - Early recognition and reporting
  - Patient isolation and contact tracing/monitoring/prophylaxis

Blocking Transmission of Disease in Healthcare

- Imperative to prevent transmission where possible
  - Maintenance of an immune workforce
  - Early recognition and reporting
  - Patient isolation and contact tracing/monitoring/prophylaxis

Maintaining an Immune Workforce

- CDC/ACIP: recommend presumptive evidence of immunity for ALL who work in health care facilities
  - Readily available at the work location
  - Written documentation of 2 doses of live measles or MMR vaccine ≥ 28d apart
  - Laboratory evidence of immunity
  - Laboratory confirmation of disease
  - Birth before 1957*

*Should still be considered for vaccination – in the outbreak setting especially, 2 doses MMR recommended

CDC. *MMWR* (2011);60(RR07):1–45

Importance of Knowing You Have an Immune Workforce

- ACIP: if measles exposures occur at a health care facility
  - Immediately evaluate contacts for evidence of immunity
  - Non-immune HCW: offer MMR dose #1, exclude from work days 5–21 after exposure (even with IG)
  - Serologic testing *not* recommended to determine HCW immunity
- Hawaii State Law – non-immune exposed persons barred from the workplace days 7–18 after exposure

CDC. *MMWR* (2011);60(RR07):1–45
§11-156 Hawaii Administrative Rules. Exhibit C

Blocking Transmission of Disease in Healthcare

- Imperative to prevent transmission where possible
  - Maintenance of an immune workforce
  - Early recognition and reporting
  - Patient isolation and contact tracing/monitoring/prophylaxis

Blocking Transmission of Disease in Healthcare

- Imperative to prevent transmission where possible
  - Maintenance of an immune workforce
  - Early recognition and reporting
  - Patient isolation and contact tracing/monitoring/prophylaxis

Early Recognition and Reporting

- Early recognition -> early containment -> fewer exposures
- Clinicians less aware of measles for fever + rash
- Reporting equally important
  - When measles is *first* suspected
  - Facilitates testing process
  - Can initiate contact process sooner if testing positive
  - Urgently reportable to HDOH

Blocking Transmission of Disease in Healthcare

- Imperative to prevent transmission where possible
  - Maintenance of an immune workforce
  - Early recognition and reporting
  - Patient isolation and contact tracing/monitoring/prophylaxis

Blocking Transmission of Disease in Healthcare

- Imperative to prevent transmission where possible
  - Maintenance of an immune workforce
  - Early recognition and reporting
  - Patient isolation and contact tracing/monitoring/prophylaxis

Isolation and Contact Tracing (I)

- For suspect and confirmed measles patients
  - Airborne isolation precautions by all staff and visitors, even if vaccinated
  - Placement in negative air pressure isolation room
- Contact tracing of all exposed to a confirmed measles case
  - HCWs
  - Patients in shared rooms
  - Visitors to the patient
  - Emergency room, common room exposures

CDC. *MMWR* (2011);60(RR07):1–45

Isolation and Contact Tracing (II)

- Identify immune status of all exposed contacts
  - Prophylaxis possible *if given early*
  - Follow non-immune contacts for 21 days
  - Furloughs, quarantine where necessary
- Each secondary case requires same contact follow up

Back at HDOH (I)

- Contact tracing for one case
  - Two airplane flights
  - Three visits to two doctors' offices
  - Emergency room visits at two different hospitals
  - Three siblings and two parents in the home
- Multiple organizations involved
  - HDOH
  - Honolulu station, CDC Division of Global Migration and Quarantine
  - Affected hospitals and physician's offices
  - Guam Department of Public Health and Social Services (initial flight)

Back at HDOH (II)

- Immune status evaluated for exposed
  - Post-exposure prophylaxis given where possible
  - Delay in identification -> outside of PEP window
  - Non-immune HCWs -> furlough strongly recommended
  - All non-immune contacts followed for 21 days
- Two weeks later, a secondary case identified
  - Not-yet-vaccinated child exposed at an outpatient physician's office
  - Repeat of above process
- No other secondary cases identified

Back at HDOH (III)

- At HDOH alone
  - 17 staff involved
  - 186 individuals contacted
  - 2 doses of IG PEP dispensed
  - 244.5 hours of manpower
- Fortunate to only have two cases
  - Product of work and collaboration by and between HDOH, CDC-DGMQ, hospitals and physicians
  - Likely also a benefit of high vaccination rates in Hawaii
    - 95% in children 19–35 months (2012)
    - 91% in teens 13–17 years (2012)

National Immunization Survey Data, 2012. http://www.cdc.gov/vaccines/imz-managers/coverage/nis/index.html. Accessed July 11, 2014.

Take Home Points (I)

- Measles is not a thing of the past
  - Prevalent in countries where our population travels
  - Making a resurgence in United States
- Vaccination is <u>critical</u> to prevention

Take Home Points (II)

- Healthcare needs to continue to be vigilant
  - Ensure an immune workforce
  - Think measles in unvaccinated patients with fever + rash and appropriate history
  - Establish isolation precautions if measles is suspected
- Report, report, report!

Reporting Measles to HDOH

Oahu (Disease Investigation Branch)	(808) 586-4586
Maui District Health Office	(808) 984-8213
Kauai District Health Office	(808) 241-3563
Big Island District Health Office (Hilo)	(808) 933-0912
Big Island District Health Office (Kona)	(808) 322-4877
After hours on Oahu	(808) 566-5049
After hours on neighbor islands (toll free)	(800) 360-2575

Thanks!

Global Epidemiology of Measles

- Still very prevalent in the developing world
  - 2014: Philippines with large, ongoing measles outbreak
  - 2012: large outbreaks in the Democratic Republic of the Congo (DRC), India, Indonesia, Ukraine, Somalia, Sudan, Pakistan, and Romania
  - 2011: large outbreaks in DRC, India, Indonesia, Nigeria, Somalia, Zambia, Chad, Philippines, Sudan, Pakistan, Romania, Uganda, Ethiopia, and Afghanistan

WHO. *Weekly Epidemiological Record* (2014);89(6):45–52
CDC. *MMWR* (2013);62(02):27–31